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(54) Title: ISOLATION OF CAROTENOID CRYSTALS FROM MICROBIAL BIOMASS

## (57) Abstract

The present invention describes a process for the direct isolation of a crystalline carotenoid compound from microbial biomass. With the process of the invention, the use of large amounts of solvent necessary to solubilize the carotenoid when applying a conventional extraction process is circumvented.

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CLASSIFICATION OF SUBJECT MATTER  
 IPC 6 C12P23/00 CC/C403/24 -- //(C12P23/00,C12R1:645)

According to International Patent Classification (IPC) or to both national classification and IPC

# B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 C12P C07C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

# C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, X	WO 98 03480 A (SIBEYN MIEKE ; GIST BROCADE B V (NL); PATER ROBERTUS MATTHEUS DE (N) 29 January 1998 see examples 1-6	1-4, 11, 12
X	US 3 268 606 A (JAEGER HK; KALAMAZOO M; UPJOHN COMPANY (US) 23 August 1966 see the whole document	1, 2, 11, 12



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CHEMICAL ABSTRACTS, vol. 120, no. 22, 30 May 1994 Columbus, Ohio, US; abstract no. 280268, YUAN, SHENG ET AL: "Method for separation of natural antitumor cis-and trans-.beta.- carotene isomers" XP002076404 see abstract & CN 1 077 190 A (NANJING NORMAL UNIVERSITY, PEOP. REP. CHINA)	4
Y	DATABASE WPI Section Ch, Week 9526 Derwent Publications Ltd., London, GB; Class B05, AN 95-194788 XP002043884 & CN 1 084 848 A (UNIV NANJING) , 6 April 1994 see abstract	4
→ Y	OOTAKI T ET AL: "Octahedral crystals in Phycomyces.. II." J CELL BIOL, MAY 1973, 57 (2) P278-88; XP002043880 UNITED STATES see figure 1	4
→ Y	GALLIK G J ET AL: "ISOLATION OF CRYSTALS FROM PHYCOMYCES-BLAKES ECANUS" BIOPHYS SOC ANNU MEET ABSTR, 14. 1970 57A, XP002043881 * abstract WPM-H10 *	4
Y	GB 1 064 645 A (BADISCHE ANILIN- & SODA-FABRIK A.G., LUDWIGSHAFEN, DE) 5 April 1967 see the whole document	4
Y	BIOLOGICAL ABSTRACTS, vol. 94, 1992 Philadelphia, PA, US; abstract no. 130801, KUDINOVA S P ET AL: "KINETICS OF BETA CAROTENE ACCUMULATION DURING THE FERMENTATION OF BLAKESLEA - TRISPORA." XP002076403 see abstract & BIOTEKHNOLOGIYA 0 (4). 1992. 3-4. CODEN: BTKNEZ ISSN: 0234-2758,	4

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9803480	A	29-01-1998	AU 3696197 A	10-02-1998
US 3268606	A	23-08-1966	DE 1267644 B	
			DK 111351 B	05-08-1968
			FR 1409130 A	06-12-1965
			GB 1019259 A	
			NL 6411184 A	29-03-1965
GB 1064645	A		CH 433269 A	
			FR 1403306 A	29-10-1965
			NL 126583 C	
			NL 6408209 A	20-01-1965
			US 3356753 A	05-12-1967